City of Hardin

Energy Consumption Profile

CITY OF HARDIN

ENERGY CONSUMPTION PROFILE

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INTRODUCTION

In cities across the state, energy is fast becoming one of the largest operating costs in municipal budgets. What used to be a minor, even inconsequential expenditure, is now the fastest growing cost; it far exceeds even the rate of inflation. With natural gas, electricity, heating oil and motor fuels taking a bigger bite out of city budgets each year, local officials are being faced with difficult choices: cut city personnel and reduce services, or increase taxes. Sometimes both measures are required just to stay even. There is another option - use traditional fuels more efficiently so that the city can provide the same quality of services to citizens with less fuel and with less disruption to city budgets. In order to do this, however, it is necessary for the city to assess how much energy it is using, and how much it is costing NOW.

WHAT IS AN ENERGY CONSUMPTION PROFILE?

This report is a complete documentation of municipal (city operations) energy consumption over the past three fiscal years. It covers all:

electricity - measured in KWH (kilowatt hours)

natural gas - measured in MCF (thousands of cubic feet)

motor fuels - gasoline and diesel measured in gallons

and it lists electric and natural gas consumption by facility and function. It also contains the cost to the city for FY 77-78, FY 78-79, and FY 79-80 of each of the above three fuels, as well as the city's total energy costs for each year.

In addition, this report contains estimates of energy use and energy costs through FY 84-85, based upon past usage.

It is important to note that an energy consumption profile is very different from a building energy audit. A building energy audit requires a walk-through examination of a structure, with specific attention given to building orientation, amount of floor space, number and square-footage of windows, the particulars of the heating system, number and wattage of light bulbs, etc. An energy consumption profile, on the other hand, requires an examination of past and current utility bills, warrants, and other records of fuel purchases. One is not necessarily better than, or a replacement for, the other. However, when used together, the two provide extremely valuable information on energy usage and costs, and what specifically can be done in a particular building, at what cost, to achieve certain dollar savings.

HOW WAS THIS REPORT COMPILED?

The figures given in this report were taken directly from city records. Natural gas and electricity consumption were recorded from the city's monthly utility bills for each separate account. Motor fuels data was collected from warrants. In some cases, additional city records, and information supplied by city staff, supplemented the data.

The figures are presented for fiscal years rather than calendar years 1) because the report is intended to be a budget planning tool; and 2) to avoid breaking the winter season into two separate years. We have provided estimates for the present year, FY 80-81, because the fiscal year is not over.

The projections for future years' energy use were supplied to the Energy Division by the utility companies, in the case of natural gas and electricity, and the U.S. Department of Energy (DOE) in the case of motor fuels. Although we believe we have gone to the best sources possible for this information, all estimates must be viewed with caution; there are many variable factors which make up utility rates: increases allowed by the Public Service Commission, deregulation, the time at which new generating facilities come on line, and the price of Canadian gas which is pegged to OPEC prices. Motor fuel costs will depend upon the world oil situation, and the rate at which new wells are developed in the U.S. There is no doubt that the cost of all traditional fuels is going up; we have done our best to provide accurate estimates on how much and how fast.

In every case, however, projections were based upon past city energy usage and local weather conditions as measured by the 30-year average of heating degree days.* This information was obtained from the nearest U.S. Department of Commerce weather station.

Because we have had one very cold and one very mild winter over the past three years, the 30-year average was factored in to normalize the consumption figures. In cases where there was neither an upward nor downward trend over three years, the data was averaged, and future use and resulting costs were based upon

* A degree day is a term that is used to describe the relationship of energy consumption to outdoor temperature. A heating degree day represents each degree of outdoor air temperature below 65°F., an assumption being made that when the outdoor temperature falls below 65° the heat must be turned on indoors. For example, when the mean daily temperature is 40°F., the heating degree days would number 25.

this average. In cases where there was an evident trend -- usually upward -- we assumed that consumption would continue to increase and we projected usage figures on that percentage basis. All of the calculations assume no conservation measures will be implemented. All of the future cost projections are based upon 1981 dollars; inflation is not factored in.

HOW IS THIS INFORMATION USEFUL?

The information contained in this report can be used in three important ways:

1. for budget planning purposes;
2. to identify and evaluate conservation options;
3. to detect abnormal or unusual increases or decreases in consumption.

1) When fuels were small constant budget items year after year, it required little thought to figure them into a city's annual budget. Today, however, underestimating consumption or providing services through a colder or snowier than normal winter can leave cities with a large deficit.

Using the utilities' best estimates and combining these figures with the city's historical use patterns and local weather factors, we have tried to provide dollar figures that cities can use with confidence during the budget planning process in providing for municipal energy costs over the next several years. Although any estimate or projection must be viewed with caution, energy will certainly be one of the largest and most volatile items in municipal budgets. In this decade, it is imperative that mayors and council members have the best possible figures to use when planning for this budget item.

2) The information in this report compares fuel consumption for individual facilities over a period of three years. It is therefore simple to see at a glance exactly where the city is spending its energy dollars and which of those expenditures accrue to the general fund. Obviously the buildings or functions which consume the most energy hold the greatest potential for saving the most dollars. When looking for places to reduce fuel use, it is necessary to examine fully the costs and benefits of each option. The consumption data, however, allows

elected officials to pinpoint those areas which merit closer examination.

In cases where conservation measures are implemented, the before and after consumption data will tell local officials whether or not they are saving money by their energy saving measures.

3) Having detailed use information makes it possible to identify unusual or excessive fuel usage. Only when there is an easily usable record of past consumption would a city staff person or official recognize a significant increase or decrease in a particular building or operation. With an existing record of several years' usage, it is far easier to determine if an unusual usage is caused by weather fluctuations, equipment breakdown, or human error.

CITY OF HARDIN, MONTANA
ELECTRIC CONSUMPTION

		FY 77-78 KWH	FY 78-79 KWH	FY 79-80 KWH
1.	Street Lighting	349,764	351,888	354,012
2.	City Shop	16,843	19,403	16,652
3.	Fire Department	1,759	1,458	1,510
4.	Water Plant-City Hall	258,940	292,040	237,320
5.	Sewage Disposal Plant	23,661	37,737	31,992
6.	Oil Tank Heater	1,110	-0-	1,320
7.	Sewage Lift Station	7,112	8,771	7,338
8.	River Pumps	105,827	107,406	81,120
9.	School Signal Light	336	289	252
10.	Swimming Pool	32,409	32,238	31,788
11.	Sewer	7,499	5,741	6,211
12.	Fire Siren	237	296	254
13.	Tennis Court	249	173	266
14.	North Crawford	1,533	826	1,211
15.	Rectifer & Water Tank (Rural)	14,012	19,810	41,084
	TOTAL	821,291	878,076	812,330
	COST PER KWH	.0300	.0315	.0319
	TOTAL COST	$24,655.31	$27,718.82	$25,913.34

CITY OF HARDIN, MONTANA
NATURAL GAS CONSUMPTION

	FY 77-78 MCF	FY 78-79 MCF	FY 79-80 MCF
1. City Hall	1,296.0	1,436.9	970.2
2. City Shop	880.5	1,166.7	714.8
3. Fire Department	339.8	307.7	233.3
4. Swimming Pool	1,421.9	2,379.6	1,205.8
TOTAL	3,938.2	5,290.9	3,124.1
COST PER MCF	.900	1.320	1.920
TOTAL COST	$3,545.17	$6,984.78	$6,001.04

CITY OF HARDIN, MONTANA
MOTOR FUELS CONSUMPTION

	FY 77-78 Gallons	FY 78-79 Gallons	FY 79-80 Gallons
Gasoline	13,077	13,017	13,084
COST PER GALLON	.5139	.5732	.9050
TOTAL COST	$6,720.26	$7,461.34	$11,931.52

CITY OF HARDIN, MONTANA
ENERGY COSTS AND PROJECTIONS

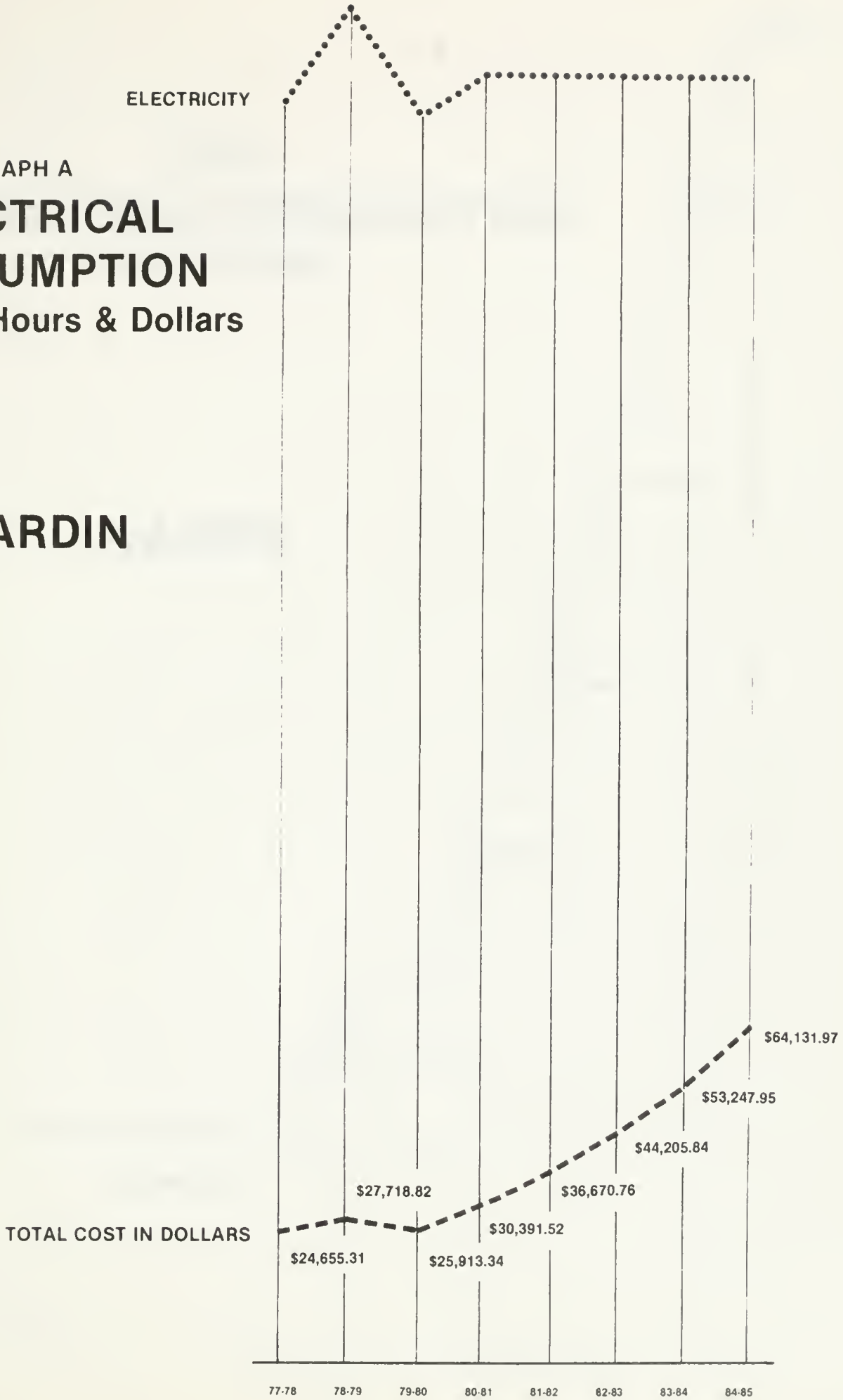
FISCAL YEAR	ELECTRICITY	NATURAL GAS	MOTOR FUELS	TOTAL ENERGY COSTS IN DOLLARS
77-78	821,291	3,938.2	13,077	
78-79	878,076	5,290.9	13,017	
79-80	812,330	3,124.1	13,084	
80-81	837,232	3,904.0	13,059	
81-82	837,232	3,904.0	13,059	
82-83	837,232	3,904.0	13,059	
83-84	837,232	3,904.0	13,059	
84-85	837.232	3,904.0	13,059	
	AVERAGE COST PER KWH	AVERAGE COST PER MCF	AVERAGE COST PER GALLON	
77-78	.0300	.900	.5139	
78-79	.0315	1.320	.5732	
79-80	.0319	1.920	.9050	
80-81	.0363	2.688	1.3450	
81-82	.0438	3.494	1.8900	
82-83	.0528	4.542	2.2500	
83-84	.0636	5.905	2.6650	
84-85	.0766	6.790	3.0910	
	TOTAL COST IN DOLLARS	AVERAGE COST IN DOLLARS	AVERAGE COST IN DOLLARS	
77-78	$24,655.31	$ 3,545.17	$ 6,720.26	$ 34,920.74
78-79	27,718.82	6,984.78	7,461.34	42,164.94
79-80	25,913.34	6,001.04	11,931.52	43,845.90
80-81	30,391.52	10,493.95	17,564.35	58,449.82
81-82	36,670.76	13,640.57	24,681.51	74,992.84
82-83	44,205.84	17,731.96	29,382.75	91,320.55
83-84	53,247.95	23,053.12	34,802.23	111,103.30
84-85	64,131.97	26,508.16	40,365.36	131,005.49

GRAPH A

ELECTRICAL CONSUMPTION

Kilowatt Hours & Dollars

HARDIN

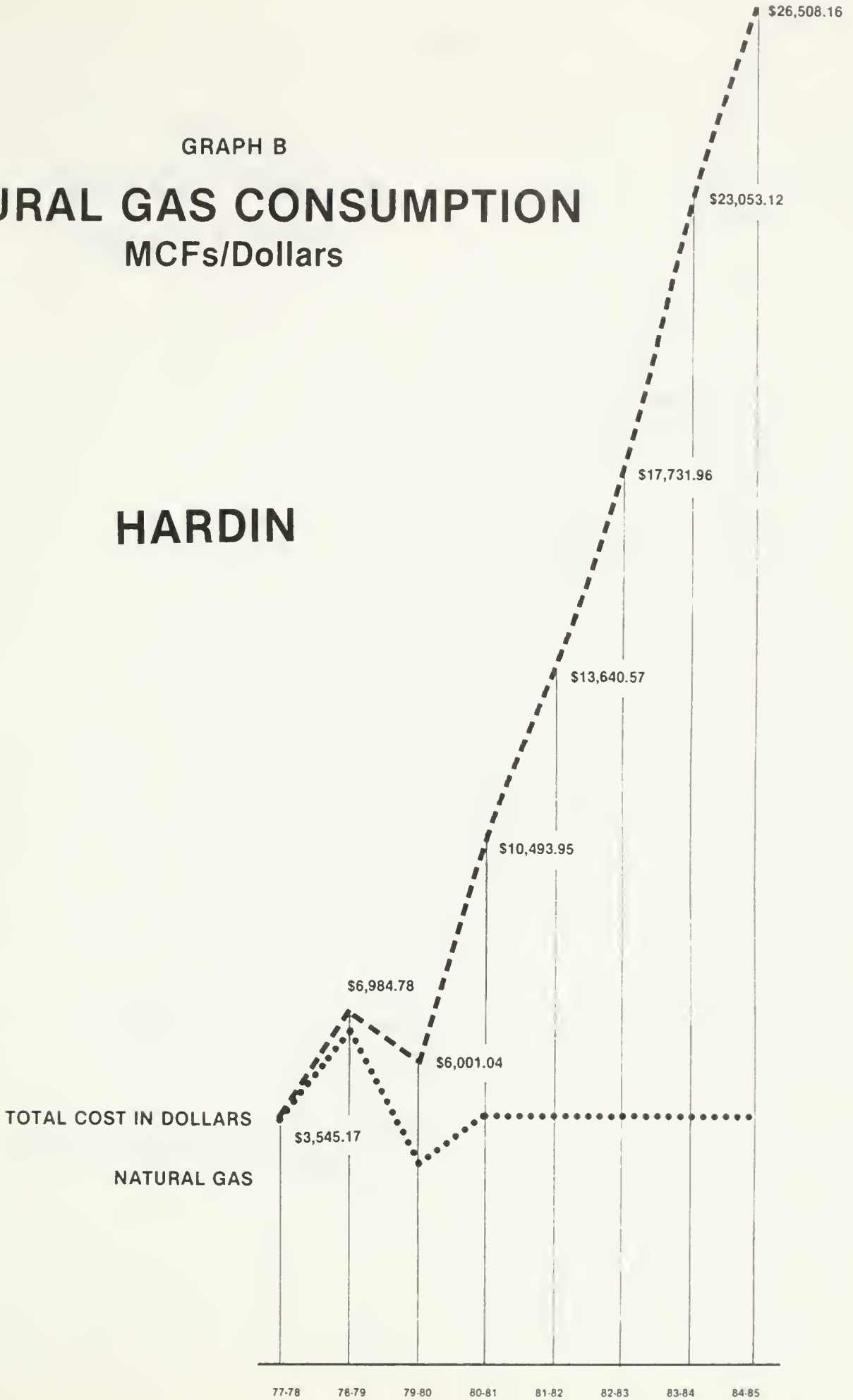


GRAPH B

NATURAL GAS CONSUMPTION

MCFs/Dollars

HARDIN

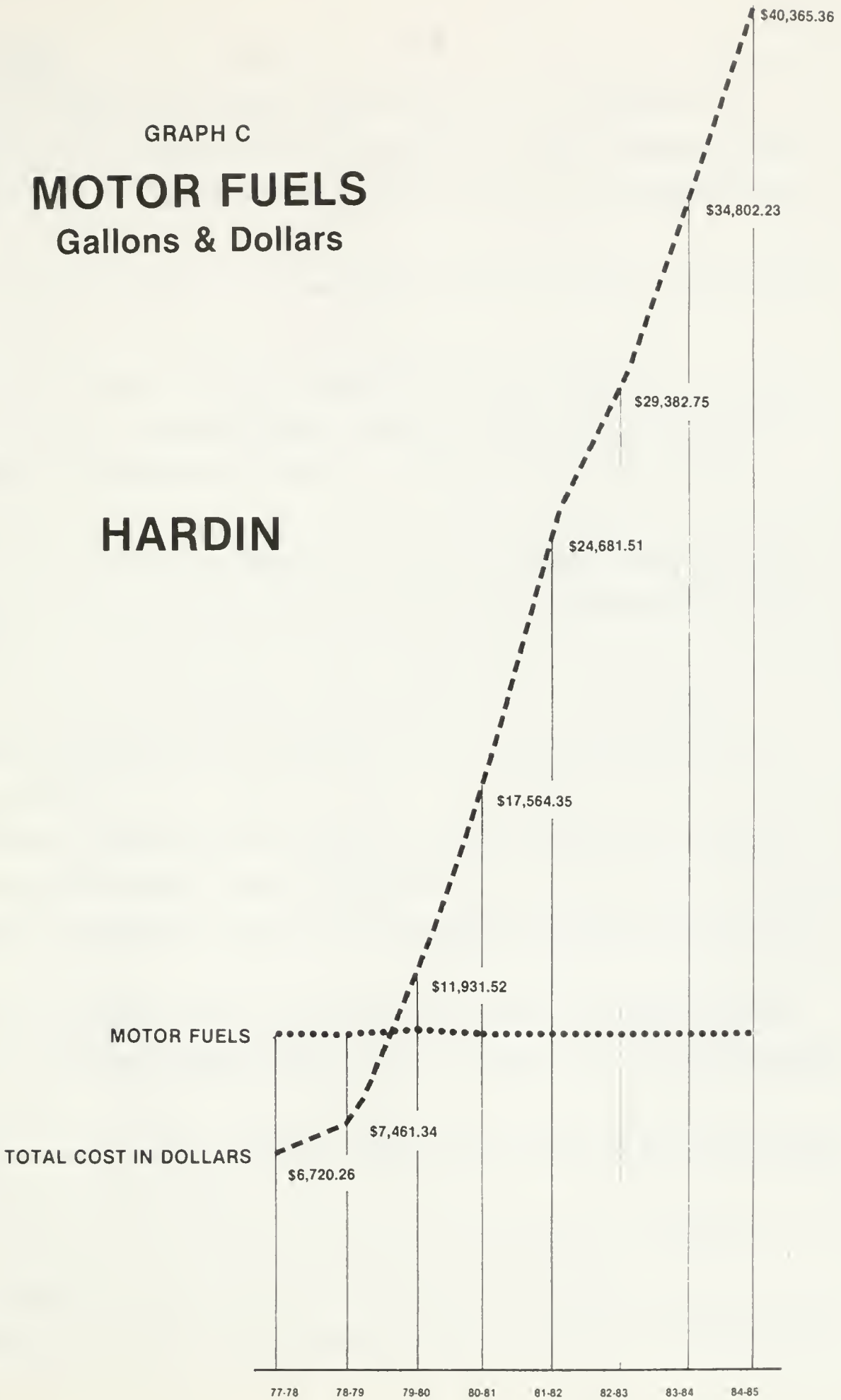


GRAPH C

MOTOR FUELS

Gallons & Dollars

HARDIN



RECOMMENDATIONS

- Lower thermostats to 65-68° in winter; raise to 78° in summer during working hours. Turn air conditioning or ventilation off after hours and on weekends (summer) and turn thermostats down to 60° after hours and on weekends during winter.

- Close off infrequently-used rooms and turn the heat down to 50-55° when not in use.

- Close all drapes, blinds, or shades overnight during winter.

- Turn off the heat one-half hour to one hour before the end of the working day. Almost all buildings can "coast" for at least one-half hour with the boiler off.

- Turn off any and all lights when not in use. At today's electricity rates, it is cheaper to turn a light off, even when a room is left unoccupied for only five minutes.

- Use natural light whenever possible and turn off ceiling fixtures.

- Replace incandescent with florescent or other energy-efficient fixtures wherever possible.

- Use task lighting whenever possible -- disconnect every other overhead fixture and place individual lamps on each desk.

- Turn off typewriters and other office equipment and machinery when not in use.

- Reduce lighting levels in hallways and staircases to minimum safe level.

- Turn down restroom water heaters to 105° in winter, and turn them completely off in summer.

- Open shades, blinds, or drapes on south-facing windows on sunny winter days. Close them on hot summer days.

- Reduce heating in fire engine rooms to lowest minimum level that will allow firefighters to perform routine maintenance on fire trucks.

- Park police patrol cars with engines off for at least half of every patrol

hour. (The Bozeman Police Department has been using this sytem and has found that it not only saves energy but increases the ticketing of violators.)

- Purchase more fuel-efficient police vehicles as older cars wear out.

- Buy, or lease, motorcycles for use by patrolmen during the summer.

- Turn off the motor in any city automobile which stands still for more than 30 seconds.

- Install heavy duty batteries and generators in street equipment so that accessories - flashing lights, etc. - can operate with the engine off.

- Switch traffic signals to red or yellow blinking lights at night and, where safe, on Sundays.

- Purchase and install pool covers on all outdoor swimming pools. This is one of the most effective money savers for any city. The pool should be covered every night. In cases where the pool is not in use through the day, it should be covered with a thermal cover which actually absorbs the sun's warmth and heats the water.

- Install one-hour timers on tennis court floodlights, so that lights are in use only when courts are in use.

Most of the above options can be undertaken at little or no cost and will result in immediate savings. It is a generally accepted conclusion that energy use in most buildings can be cut by at least 25% merely by conscientious attention to turning out lights, keeping thermostats down, closing off unused rooms, and similar simple measures. The next 25% saving usually requires some thought and monetary investment. However, there are many options that will save enough energy dollars to pay for themselves in a year or less. The advantage of these, of course, is that the city need not budget extra dollars. Instead of paying for fuel, the city instead spends the dollars allocated to energy bills on fuel saving installations.

It is important, therefore, before investing in energy saving devices or installations, that local officials investigate the cost and payback period (time

it takes for a device to save enough energy to pay for itself) before deciding which ones will best meet the city's needs.

After this decision has been made, it is equally important that energy consumption (not dollars, because they are going up regardless) be compared before and after the change. Only by making this comparison will the city know if it is saving energy, and if it is saving enough to warrant using similar measures in other structures.

Finally, when a city does save, through conservation, dollars that would otherwise have been spent on fuels, then it only makes sense to take those dollars budgeted, but not spent, for fuels, and invest them in conservation equipment or retrofits. A mild winter like the one just past will probably leave most cities with extra dollars which could be spent to insure savings on next year's energy costs. Anticipating energy prices for this decade, there is probably no better investment of dollars for any city. In most cases, investing in reducing next year's energy bills will probably save more money than a bank account or traditional investment will return. Of course, each year, as energy costs get higher and higher, conservation investments made today, yield a higher and higher return.

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